

Applicant: Demir et al.
Application No.: 10/736,294

Amendments to Drawings:

The attached sheet of drawings (6/6) includes changes to original Figure 6. This sheet replaces the original sheet (6/6) including Figures 6-8.

In Figure 6, the input to adder 610 has been changed from "I" to --Q-- and the output from adder 605 has been changed from "Q" to --I--.

REMARKS/ARGUMENTS

Claims 1, 2, 4, 6-8, 10-15, 17, 19-21, 23-26, 34, 36-38 and 40-49 are currently pending in this application. Claims 9, 22, 39 and 50-56 are cancelled without prejudice. Claim 1 has been amended to incorporate the limitations of canceled dependent claim 9. Claim 14 has been amended to incorporate the limitations of canceled dependent claim 22. Claim 34 has been amended to incorporate the limitations of canceled dependent claim 39. Claims 10, 23 and 40 have been amended to change their dependency to claims 1, 14 and 34, respectively. A replacement sheet is submitted herewith to correct minor typographical errors found in Figure 6. The Applicants submit that no new matter has been added to the application by the amendments.

Claim Amendments Do Not Require Further Consideration and Search

The Applicants submit that the claim amendments included in this Reply do not raise new issues that would require further consideration and search, but instead serve to rewrite dependent claims that the Applicants believe include allowable subject matter in independent form including all of the limitations of the base claim and the respective dependent claim.

Claim Rejections

Claims 44-49 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,169,463 (Mohindra et al.). Mohindra discloses a quadrature modulator with set-and-forget carrier leakage compensation.

The Examiner is respectfully directed to refer to Figures 1, 2 and 6 of the Applicants' application. In accordance with the present invention, a digital direct current (DC) offset compensation module 210 (see Figure 2) is incorporated in a digital baseband (DBB) compensation processor 130 of a DBB transmitter 100 (see

Figure 1) to correct, (i.e., suppress), carrier leakage associated with a modulator 170 in an analog radio transmitter 150 by adjusting the DC levels of in-phase (I) and quadrature (Q) signal components 110, 115 based on previously determined (i.e., stored) first and second DC offset compensation values. A power detector 175 is used to determine respective first and second minimum detected readings at the local oscillator (LO) frequency of the modulator 170.

First and second DC offset compensation values (i.e., compensation factors K_1 and K_2) are derived by interpolating the first and second minimum detected readings. The first and second DC offset compensation values are then stored for future reference, whereby the DC levels of the I and Q signal components are adjusted based on the first and second DC offset compensation values, respectively.

Claims 44, 46 and 48 recite a digital DC offset compensation module having two signal inputs including an I signal component and a Q signal component, wherein a minimum detected reading associated with each of the signal inputs is determined, first and second DC offset compensation values are determined based on the minimum detected readings, and the digital DC offset compensation module is configured to eliminate carrier leakage associated with the modulator by adjusting the respective DC levels of the two signal inputs based on the first and second DC offset compensation values.

Mohindra fails to teach or suggest determining a minimum detected reading associated with each of the signal inputs. Furthermore, Mohindra fails to teach or suggest determining first and second DC offset compensation values based on the minimum detected readings. Additionally, Mohindra fails to teach or suggest a digital DC offset compensation module which is configured to eliminate carrier leakage associated with the modulator by adjusting the respective DC levels of the two signal inputs based on the first and second DC offset compensation values which were determined based on the minimum detected readings.

The Examiner asserts that the following portion (col. 2, lines 7-42) of Mohindra teaches the above-mentioned features:

"carrier leakage measurement means for measuring a first carrier leakage signal of said first local oscillator signal in said in-phase modulation branch, and a second carrier leakage signal of said second local oscillator signal in said quadrature branch;

a controllable signal generating means for generating a first monotonously increasing signal and a second monotonously increasing signal; and

holding means for holding values of said first and second monotonously increasing signals, said holding means being coupled to said first and second summing means so as to form feedback paths;

said carrier leakage measurement means adopting a first state in which said first and second carrier leakage signals are measured, and a second state in which said controllable signal generating means is controlled to stop generating said first and second monotonously increasing signals, said second state being adopted from said first state during measurement of said first and second carrier leakage signals.

The invention is based upon the insight that usually parameters influencing carrier leakage are slowly varying with time so that there is no need for continuous compensation. Based upon this insight, it was realized that a simple but robust carrier leakage compensation could be implemented being operative at predetermined points in time, such as at switching on power, or, when used in a communications apparatus, possibly also at channel switching. When used in a communication device such as a broad band CDMA communications device, in which, in principle, no channel switching is needed, there is only a need to apply carrier leakage compensation at power on of the communications device. In such a case, after power on, power to components used for carrier leakage compensation could even be switched off, thus achieving power savings in such a portable communications device."

The Applicants submit that nowhere in the portion of Mohindra presented above is the feature of determining a minimum detected reading associated with each of the signal inputs taught or suggested. Furthermore, nowhere in the portion

of Mohindra presented above is the feature of determining first and second DC offset compensation values based on the minimum detected readings taught or suggested. Additionally, nowhere in the portion of Mohindra presented above is the feature of a digital DC offset compensation module which is configured to eliminate carrier leakage associated with the modulator by adjusting the respective DC levels of the two signal inputs based on the first and second DC offset compensation values which were determined based on the minimum detected readings taught or suggested.

Since Mohindra fails to disclose all of the features recited in claims 44, 46 and 48, the Applicants submit that claims 44, 46 and 48 are patentable over the prior art of record.

With respect to claims 45, 47 and 49, these claims are dependent upon claims 44, 46 and 48, respectively, and are believed to be allowable for the same reasons provided above.

In view of the arguments presented above, the withdrawal of the rejection of claims 44-49 under 35 U.S.C. §102(b) is respectfully requested.

Claims 1, 2, 7, 8, 14, 15, 20, 21, 34, 37 and 38 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0219884 (Mo et al.) in view of U.S. Patent No. 6,759,902 (Kossor).

The independent claims 1, 14 and 34 have been amended to incorporate the subject matter of dependent claims 1, 22 and 39.

Claims 9, 10, 22, 23, 39 and 40 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mo and Kossor, and further in view of Mohindra. The features of claims 9, 22 and 39 are the same as the features described above with respect to claims 44, 46 and 48, and the Examiner relies on the same portion of Mohindra to reject claims 9, 22 and 39.

As already mentioned above, the Applicants submit that nowhere in the portion of Mohindra presented above is the feature of determining a minimum detected reading associated with each of the signal inputs taught or suggested. Furthermore, nowhere in the portion of Mohindra presented above is the feature of determining first and second DC offset compensation values based on the minimum detected readings taught or suggested. Additionally, nowhere in the portion of Mohindra presented above is the feature of a digital DC offset compensation module which is configured to eliminate carrier leakage associated with the modulator by adjusting the respective DC levels of the two signal inputs based on the first and second DC offset compensation values which were determined based on the minimum detected readings taught or suggested.

Since Mohindra fails to disclose all of the features recited in amended claims 1, 14 and 34, the Applicants submit that claims 1, 14 and 34 are patentable over the prior art of record.

With respect to claims 2, 4, 6-8, 10-13, 15, 17, 19-21, 23-26, 36-38 and 40-43, these claims are dependent upon claims 1, 14 and 34, respectively, and are believed to be allowable for the same reasons provided above.

In view of the arguments presented above, the Applicants submit that claims 1, 2, 4, 6-8, 10-15, 17, 19-21, 23-26, 34, 36-38 and 40-43 are patentable over the prior art of record.

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Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephone interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing amendment and remarks, Applicants respectfully submit that the present application, including claims 1, 2, 4, 6-8, 10-15, 17, 19-21, 23-26, 34, 36-38 and 40-49, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

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SW/bbf

Enclosure